

## Fast Recycler Transfers Documentation

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Send suggestions and comments to [ad-pbar-tuning-adminNOSPAM@fnal.gov](mailto:ad-pbar-tuning-adminNOSPAM@fnal.gov) (remove "NOSPAM")

**Sequencer:** Pbar Annex

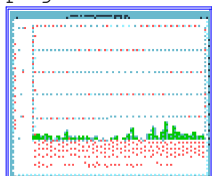
**Fast Recycler Aggregate:** Fast Recycler Start

**Previous Aggregate:** None

**Purpose of this Aggregate:**

**How to get back to stacking form here:**

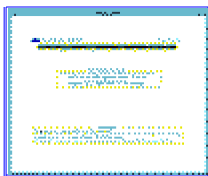
```
::: WAIT_DEVICE V:MSHOOT .
::: BEAM_SWITCH Pbar_Source Off .
    To avoid taking beam to Pbar while switching form 120GeV stacking mode
    to 8GeV shot mode, we take the software beam switch.
::: NOTIFY Start .
    Sends a Channel 13 Notify message to http://www-bd.fnal.gov/cgi-
    bin/notify\_mes.pl?chl3=text
::: START_PGM SA1127 .
    Pbar Radiation Detector Display (keeper is Tony Leveling) on comfort
    display 102. This SA can be used during the beam line tune-up to
    verify that radiation levels are not high enough to cause a radiation
    trip. The program emulates the actions of the radiation detector
    cards. It updates every 60 seconds and takes a 15 minutes rolling
    average of the radiation losses and normalizes each radiation detector
    so that a value of 1 corresponds to the radiation trip level. The
    parameters for the individual radiation detectors can be found on D106
    ACC/DEB < 1> to < 3>. G:RA{####} is an integrating real-time read
    back of the radiation detector. Every 60 seconds, which is not
    concurrent with the supercycle, G:RA{####} is reset to zero and starts
    integrating all over again. G:RD{####} takes the number of G:RA
    {####} before it is reset and keeps that value until G:RA{####} is
    reset again. When doing the reverse proton tune-up later in the shot,
    if any radiation detector gets near to 1 on the plot, the beam switch
    should be taken to avoid a radiation trip. If the SA1127 plot dies, it
    can be restarted by reissuing this command, or manually through Acnet
    page P151. A screen capture of SA1127 is shown below.
```



Pbar Radiation Detector Display. Click on thumbnail to view full-sized image.

```
::: START_PGM P162 .
    Starts the Accumulator BPM TBT Page P162 (keeper is Keith Gollwitzer).
    This page, as shown below, checks the status of the Accumulator BPM
    houses and issues resets to any house that is not online. This allows
    plenty of time for the BPM houses to reboot before they are need in the
    beam line tune-up. Upon completion, this application will self
    terminate and the window will close on its own.
```

## Fast Recycler Start



Accumulator BPM page. Click on thumbnail to view full-sized image.

```
::: WAIT_FOR SECS 30 .
```

A 30 second delay to allow the Accumulator BPM program above to complete its BPM house check.

```
::: SETIT_DEVICE V:PSHOOT =1 .
```

Devices that start with V: are state parameters. State parameters define the operational state of a device or accelerator, allow the sequencers to be more automated, and prevent the different sequencers from getting out of sequence with each other. Often one sequencer waits at a certain spot until another sequencer changes a state parameter. V:PSHOOT is a state parameter for the Pbar transfer state. V:PSHOOT state 1 means "not ready for transfer." Later in this aggregate, V:PSHOOT is set to 4 ("Ready for Main Injector Tune up"). The **Main Injector Shot Transfer Line Tuneup** aggregate waits for PSHOOT to be set to 4 ("Ready for Main Injector Tune up") before starting its beam line tune-up.

```
::: SET_ENUMERATED V:APSMOD .
```

V:APSMOD is a state parameter representing the operational mode of the Pbar Source. The **set\_enumerated** command asks the user to selected from a menu of V:APSMOD state values as shown below. Some common values for V:APSMOD include: 7 = Stacking, 8 = Reverse Protons, 9 = Pbar Shots to the Tevatron, and 12 = Pbar Shots to the Recycler.

```
1 Shutdown
2 Access
3 Diagnosing Failure
4 Repairing Failure
5 Recovery / Turn On
6 Standby
7 Stacking
8 Reverse Protons
9 Pbar Shots to the Tevatron
10 Deceleration
11 Store
12 Pbar Shots to the Recycler
```

```
::: SET_DEVICE A:APSHOT +=1 .
```

Increments the Pbar transfer series number by one. This number is incremented before and after any Pbar transfer from the Accumulator to the Tevatron or Accumulator to the Recycler.

```
::: ACL WAIT_FOR_READING_MATCH .
```

Runs an Accelerator Command Language (ACL) script called WAIT\_FOR\_READING\_MATCH that waits for "SDA Shot/Store #" (A:FILE) to read the same value as the Pbar transfer series number (A:APSHOT). More information on ACL scripts can be found at [http://adcon.fnal.gov/userb/www/controls/clib/intro\\_acl.html](http://adcon.fnal.gov/userb/www/controls/clib/intro_acl.html).

```
::: SET_DEVICE A:SHTNUM =0 .
```

Sets the "Pbar transfer series Shot #" parameter (A:SHTNUM) to zero. Later on A:SHTNUM is incremented by one for every Pbar transfer.

```
::: SET_DEVICE V:CASPBT =1 .
```

The "Pbar transfer SDA case trigger" state (V:CASPBT) is set to 1, which represents "Set up." Possible values for this state parameter include: 1 = Set up, 2 = Unstack Pbars, 3 = Transfer Pbars from Accumulator to Main Injector, 4 = Accelerate Pbars in the Main Injector, 5 = Coalesce Pbars in the Main Injector.

## Fast Recycler Start

```
::: SET_DEVICE V:SETPBT =1 .
    Sets the "Pbar transfer SDA set in case" state device to 1. D88
    currently shows no state information descriptions for the different
    states of this parameter.

::: CHECK_DEVICE A:APSHOT READING .
    Prints the value of the "Pbar Transfer Series Number" parameter
    (A:APSHOT) in the message window at the bottom of the sequencer in the
    following format.
    COM: A:APSHOT present value = #####.00000

::: SHOT_LOG CHAPTER .
    Starts a new shot log chapter in the Recycler shot scrapbook at
    http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=rscrap04&load=no. The
    shot scrapbook header lists the time, date and shot number (A:APSHOT
    which was incremented above). Any writes to the Recycler shot
    scrapbook prior to this command would go in the previous shot scrapbook
    chapter.

::: SHOT_LOG COMMENT .
    Adds the following comment to the Pbar portion of the shot log chapter
    started in the previous command.
    🟢 {Time}- Beginning shots to the Recycler, the starting stack size is ###.#####. -
    Sequencer

::: CTLIT_DEVICE D:BSC925 OFF .
::: ABORT_MASK PBAR_SOFT ENABLED .
    The following three ABORT_MASK commands toggle the P67 abort masks from the
    stacking configuration to the shots configuration. This command unmask the Pbar
    Software Abort.

::: ABORT_MASK AP1_120_PS ENABLED .
    The P67 abort for 120 GeV power supplies is masked since we will be
    running 8 GeV beam.

::: ABORT_MASK AP1_8_PS DISABLED .
    The P67 abort for 8 GeV power supplies is unmasked to prepare for 8 GeV
    operation.

::: INSTRUCT 206 .
```

The next steps set up the AP1 and AP3 lines for 8 GeV reverse proton operation. Alarms are also set up.

Interrupt anywhere in this box to continue.

```
::: ALARM_LIST PBAR 2 .
    Bypasses the D59 alarm list entitled "AP1 120".
```



Pbar alarm list 2 after it has been bypassed by the Pbar Sequencer.. Click on thumbnail to view full-sized

```
::: SET_SEQ FILE 37 .
    File #37 turns off AP1 120Gev Supplies. All of the devices in this
    list are located in F23 service building.
    M:HV100 TURN DEVICE OFF ok
    M:Q101 TURN DEVICE OFF ok
    M:Q102 TURN DEVICE OFF ok
```

## Fast Recycler Start

M:HV102	TURN DEVICE OFF	ok
M:Q103	TURN DEVICE OFF	ok
M:Q104	TURN DEVICE OFF	ok
M:Q105	TURN DEVICE OFF	ok
M:V105	TURN DEVICE OFF	ok
M:Q106	TURN DEVICE OFF	ok
M:Q107	TURN DEVICE OFF	ok
M:Q108	TURN DEVICE OFF	ok
M:Q109I	TURN DEVICE OFF	ok
M:Q109V	TURN DEVICE OFF	ok

::: INSTRUCT 307 .

The next steps restore AP1/3 settings from a Recycler Shots save file. Choose SHOTS file #1149. This is the current default for Fast Recycler Shots.

Interrupt anywhere in this box to continue.

::: SET\_SEQ FILE\_SR 79 .

File #79 restores AP1 line 8 GeV device settings from a D1 file. The Pbar Sequencer Operator is prompted to chose a shot setup file. Unless told otherwise, the Pbar Sequencer Operator should always select file 1149 from the D1 category "SHOTS."

M:HV200	RESTORE (D1 file)	SETTING	1149
ok			
M:HT100	RESTORE (D1 file)	SETTING	1149
ok			
M:HT100	RESTORE (D1 file)	ANL ALARM	1149
ok			
M:Q201	RESTORE (D1 file)	SETTING	1149
ok			
M:VT101	RESTORE (D1 file)	SETTING	1149
ok			
M:VT101	RESTORE (D1 file)	ANL ALARM	1149
ok			
M:VT101A	RESTORE (D1 file)	SETTING	1149
ok			
M:VT101A	RESTORE (D1 file)	ANL ALARM	1149
ok			
M:Q102R	RESTORE (D1 file)	BASIC STS	1149
ok			
M:Q202	RESTORE (D1 file)	SETTING	1149
ok			
M:HV202	RESTORE (D1 file)	SETTING	1149
ok			
M:Q203	RESTORE (D1 file)	SETTING	1149
ok			
M:Q204	RESTORE (D1 file)	SETTING	1149
ok			
M:Q205	RESTORE (D1 file)	SETTING	1149
ok			
M:V205	RESTORE (D1 file)	SETTING	1149
ok			
M:HT105	RESTORE (D1 file)	SETTING	1149
ok			
M:HT105	RESTORE (D1 file)	ANL ALARM	1149
ok			
M:Q206	RESTORE (D1 file)	SETTING	1149
ok			

## Fast Recycler Start

```

M:Q207    RESTORE (D1 file)    SETTING    1149
      ok
M:HT107   RESTORE (D1 file)    SETTING    1149
      ok
M:HT107   RESTORE (D1 file)    ANL ALARM 1149
      ok
M:Q208    RESTORE (D1 file)    SETTING    1149
      ok
M:VT108   RESTORE (D1 file)    SETTING    1149
      ok
M:VT108   RESTORE (D1 file)    ANL ALARM 1149
      ok
M:Q209    RESTORE (D1 file)    SETTING    1149      ok
File #79 also restores AP1 diagnostics setups for SEMs, Toroids, Loss
Monitors and the AP0 Wall Current Monitor.
M:SMA1S   RESTORE (D1 file)    SETTING    1149
      ok
M:SMA1S1  RESTORE (D1 file)    SETTING    1149
      ok
M:SMA1C   RESTORE (D1 file)    SETTING    1149      ok

M:SMA1C1  RESTORE (D1 file)    SETTING    1149
      ok
D:TRSM1S  RESTORE (D1 file)    SETTING    1149
      ok
D:TRSM1R  RESTORE (D1 file)    SETTING    1149
      ok
D:TRSM1C  RESTORE (D1 file)    SETTING    1149
      ok
D:TRSM1D  RESTORE (D1 file)    SETTING    1149
      ok
M:TR109S  RESTORE (D1 file)    SETTING    1149
      ok
M:TR109T  RESTORE (D1 file)    SETTING    1149
      ok
M:LMHLD   RESTORE (D1 file)    SETTING    1149
      ok
M:LMHLDs  RESTORE (D1 file)    SETTING    1149
      ok
M:AP1WCS  RESTORE (D1 file)    SETTING    1149      ok

M:AP1WCT  RESTORE (D1 file)    SETTING    1149
      ok
M:TR105S  RESTORE (D1 file)    SETTING    1149
      ok
M:TR105T  RESTORE (D1 file)    SETTING    1149      ok
Note that device names that appear in lower case are marked "out of
service" and are in effect bypassed from the list.

d:h926rp  RESTORE (D1 file)    SETTING    1149      ok
d:h926pb  RESTORE (D1 file)    SETTING    1149      ok
m:v105rp  RESTORE (D1 file)    SETTING    1149      ok
m:v105pb  RESTORE (D1 file)    SETTING    1149      ok
::: SET_SEQ FILE_SR 87      .
File #87 restores AP3 line device settings from a D1 file. The Pbar Sequencer Operator is
prompted to chose a shot setup file. Unless told otherwise, the Pbar Sequencer
Operator should always select file 1149 from the D1 category "SHOTS."
D:Q901    RESTORE (D1 file)    SETTING    1149
      ok
D:Q901    RESTORE (D1 file)    ANL ALARM 1149
      ok

```

# Fast Recycler Start

D:V901	RESTORE (D1 file)	SETTING	1149	
	ok			
D:V901	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:VS901	RESTORE (D1 file)	SETTING	1149	
	ok			
D:VS901	RESTORE (D1 file)	ANL ALARM	1149	ok
D:HT901	RESTORE (D1 file)	SETTING	1149	
	ok			
D:HT901	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q903	RESTORE (D1 file)	SETTING	1149	
	ok			
D:Q903	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:VS904	RESTORE (D1 file)	SETTING	1149	
	ok			
D:VS904	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:HT906A	RESTORE (D1 file)	SETTING	1149	
	ok			
D:HT906A	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:VT906	RESTORE (D1 file)	SETTING	1149	
	ok			
D:VT906	RESTORE (D1 file)	ANL ALARM	1149	ok
D:HT906B	RESTORE (D1 file)	SETTING	1149	
	ok			
D:HT906B	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q907	RESTORE (D1 file)	SETTING	1149	
	ok			
D:Q907	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q909	RESTORE (D1 file)	SETTING	1149	
	ok			
D:Q909	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:HT910	RESTORE (D1 file)	SETTING	1149	
	ok			
D:HT910	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q913	RESTORE (D1 file)	SETTING	1149	
	ok			
D:Q913	RESTORE (D1 file)	ANL ALARM	1149	ok
D:QS915	RESTORE (D1 file)	SETTING	1149	
	ok			
D:QS915	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q914	RESTORE (D1 file)	SETTING	1149	
	ok			
D:Q914	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:H914	RESTORE (D1 file)	SETTING	1149	
	ok			
D:H914	RESTORE (D1 file)	ANL ALARM	1149	
	ok			
D:Q916	RESTORE (D1 file)	SETTING	1149	

## Fast Recycler Start

ok				
D:Q916	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:Q917	RESTORE	(D1 file)	SETTING 1149	
ok				
D:Q917	RESTORE	(D1 file)	ANL ALARM 1149	ok
D:QS917	RESTORE	(D1 file)	SETTING 1149	
ok				
D:QS917	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:VT917	RESTORE	(D1 file)	SETTING 1149	
ok				
D:VT917	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:Q919	RESTORE	(D1 file)	SETTING 1149	
ok				
D:Q919	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:QS919	RESTORE	(D1 file)	SETTING 1149	
ok				
D:QS919	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:VT925	RESTORE	(D1 file)	SETTING 1149	
ok				
D:VT925	RESTORE	(D1 file)	ANL ALARM 1149	ok
D:Q924	RESTORE	(D1 file)	SETTING 1149	
ok				
D:Q924	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:QS925	RESTORE	(D1 file)	SETTING 1149	
ok				
D:QS925	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:HS925	RESTORE	(D1 file)	SETTING 1149	
ok				
D:HS925	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:Q926	RESTORE	(D1 file)	SETTING 1149	
ok				
D:Q926	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:QS926	RESTORE	(D1 file)	SETTING 1149	
ok				
D:QS926	RESTORE	(D1 file)	ANL ALARM 1149	ok
D:H926RP	RESTORE	(D1 file)	SETTING 1149	ok
D:H926PB	RESTORE	(D1 file)	SETTING 1149	ok
D:H926	RESTORE	(D1 file)	SETTING 1149	
ok				
D:H926	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
D:QS928	RESTORE	(D1 file)	SETTING 1149	
ok				
D:QS928	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
A:EKIKP	RESTORE	(D1 file)	SETTING 1149	ok
<b>File #87 also restores analog alarms limits for the core horizontal and vertical trombones.</b>				
A:CH1T2	RESTORE	(D1 file)	ANL ALARM 1149	
ok				
A:CH2T2	RESTORE	(D1 file)	ANL ALARM 1149	

## Fast Recycler Start

```

    ok
A:CH3T2  RESTORE (D1 file)  ANL ALARM 1149
    ok
A:CV1T2  RESTORE (D1 file)  ANL ALARM 1149
    ok
A:CV2T2  RESTORE (D1 file)  ANL ALARM 1149
    ok
A:CV3T2  RESTORE (D1 file)  ANL ALARM 1149                                ok
::: SET_SEQ FILE 41 .
File #41 resets AP1 8 GeV devices.  This will clear any trip status
before turning these supplies on.  I:F17B3 is located in the F2 service
building, and the rest of the devices in this list are located in the
F23 service building.
I:F17B3  RESET DEVICE
                                           ok
M:HV200  RESET DEVICE
M:Q201   RESET DEVICE
    ok
M:HV202  RESET DEVICE
    ok
M:Q203   RESET DEVICE
                                           ok
M:Q204   RESET DEVICE
    ok
M:Q205   RESET DEVICE
M:V205   RESET DEVICE
    ok
M:Q206   RESET DEVICE
    ok
M:Q207   RESET DEVICE
    ok
M:Q208   RESET DEVICE
M:Q209   RESET DEVICE
                                           ok
                                           ok
::: SET_SEQ FILE 42 .
File #42 turns on AP1 8 GeV devices.  I:F17B3 is located in the F2
service building, and the rest of the devices in this list are located
in the F23 service building.
I:F17B3  TURN DEVICE ON
    ok
M:HV200  TURN DEVICE ON
    ok
M:Q201   TURN DEVICE ON
    ok
M:VT101  TURN DEVICE ON
    ok
M:VT101A TURN DEVICE ON
    ok
M:Q102R  SET NEGATIVE
                                           ok
M:Q202   TURN DEVICE ON
    ok
M:HV202  TURN DEVICE ON
    ok
M:Q203   TURN DEVICE ON
    ok
M:Q204   TURN DEVICE ON
    ok
M:Q205   TURN DEVICE ON
    ok
M:HT105  TURN DEVICE ON
    ok

```



## Fast Recycler Start

```
M:V205    TURN DEVICE ON
ok
M:Q206    TURN DEVICE ON
ok
M:Q207    TURN DEVICE ON
ok
M:HT107   TURN DEVICE ON
ok

M:Q208    TURN DEVICE ON
ok
M:VT108   TURN DEVICE ON
ok
M:Q209    TURN DEVICE ON
ok

::: SET_SEQ FILE 47
File #47 resets AP3 line devices.  This will clear any trip status
before trying to turn the supplies on.  Devices in this list are
located in AP30 (D:Q901, D:V901, D:Q903, D:Q907, and D:Q909), F27
(D:Q913, D:Q914, D:Q916, D:Q917, and D:Q919), and AP0 (D:H914, D:Q924,
D:Q926 and D:H926).
D:Q901    RESET DEVICE
ok
D:V901    RESET DEVICE
ok
D:Q903    RESET DEVICE
ok
D:Q907    RESET DEVICE
ok
D:Q909    RESET DEVICE
ok
D:Q913    RESET DEVICE
ok
D:Q914    RESET DEVICE
ok
D:H914    RESET DEVICE
ok
D:Q916    RESET DEVICE
ok
D:Q917    RESET DEVICE
ok
D:Q919    RESET DEVICE
ok
D:Q924    RESET DEVICE
ok
D:Q926    RESET DEVICE
ok
D:H926    RESET DEVICE
ok

::: SET_SEQ FILE 48
File #48 turns on AP3 line devices.  Devices in this list are located in AP30 (D:Q901,
D:V901, D:Q903, D:Q907, and D:Q909), F27 (D:Q913, D:Q914, D:Q916, D:Q917,
and D:Q919), and AP0 (D:H914, D:Q924, D:Q926 and D:H926).
D:Q901    TURN DEVICE ON
ok
D:V901    TURN DEVICE ON
ok
D:HT901   TURN DEVICE ON
ok
D:Q903    TURN DEVICE ON
ok
D:HT906A  TURN DEVICE ON
ok
D:VT906   TURN DEVICE ON
```

## Fast Recycler Start

```

ok
D:HT906B TURN DEVICE ON
ok
D:Q907 TURN DEVICE ON
ok
D:Q909 TURN DEVICE ON
ok
D:HT910 TURN DEVICE ON
ok
D:Q913 TURN DEVICE ON
ok
D:Q914 TURN DEVICE ON
ok
D:H914 TURN DEVICE ON
ok
D:Q916 TURN DEVICE ON
ok
D:Q917 TURN DEVICE ON
ok
D:VT917 TURN DEVICE ON
ok
D:Q919 TURN DEVICE ON
ok
D:Q924 TURN DEVICE ON
ok
D:Q926 TURN DEVICE ON
ok
D:H926 TURN DEVICE ON
ok
D:VT925 TURN DEVICE ON

```

```

::: ALARM_LIST PBAR 12

```

Enables the D59 alarm list entitled “AP3”. This list consists of two lists “AP3 DGTL” and “AP3 ANLG.”



Pbar alarm list 12, 13, and 14 after they have been enabled by the Pbar Sequencer.. Click on thumbnails to view full-sized images.

```

::: EVENT 91 DISABLE
::: WAIT_FOR SECS 10
::: CTL_DEVICE M:Q102 RESET

```

M:Q102 was already issued a "reset" and "on" in file 41 above; however, it has a transfer switch that takes a finite amount of time to switch over. This command and the command that follows makes sure that M:Q102 is on before 8 GeV beam is run in the AP1 line.

```

::: CTLIT_DEVICE M:Q202 ON

```

M:Q102 was already issued a "reset" and "on" in file 41 above; however, it has a transfer switch that takes a finite amount of time to switch over. This command and the command that follows makes sure that M:Q102 is on before 8 GeV beam is run in the AP1 line.

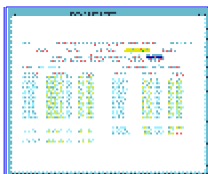
```

::: ALARM_LIST PBAR 3

```

Enables the D59 alarm list entitled “AP1 8GEV”.

## Fast Recycler Start



Pbar alarm list 3 after it has been enabled by the Pbar Sequencer. Click on thumbnail to view full-sized image.

```

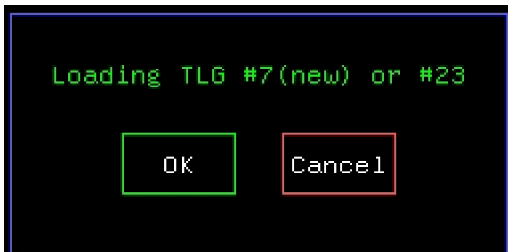
::: ACL COMPARE_10_DEVICES .
Runs an Accelerator Command Language (ACL) script called
COMPARE_10_DEVICES. The script verifies that all 8GeV values are the
same on all cycles for ramped P1 and P2 line devices. The following 3
sequencer commands run the same script to check the 8 GeV ramps on
other P1 and P2 line devices. More information on ACL scripts can be
found at http://adcon.fnal.gov/userb/www/controls/clib/intro\_acl.html.

```

```

::: ACL COMPARE_10_DEVICES .
::: ACL COMPARE_10_DEVICES .
::: ACL COMPARE_10_DEVICES .
::: WAIT_FOR SECS 3 .
::: ACKNOWLEDGE .

```



```

::: LOAD_TLG 7 REPEAT .
Loads TLG #7
::: WAIT_DEVICE G:TLGSEQ .
Waits for TLG #7 to load.
::: EVENT 88 TRIGGER .
::: BOOST_INTENSITY EVT16 2 .
::: SETIT_DEVICE V:PSHOOT =4 .
::: BEAM_SWITCH Pbar_Source On .
::: ALARM_LIST PBAR 52 .

```

Bypasses the D59 alarm list entitled "ARF1".



Pbar alarm list 52 after it has been bypassed by the Pbar Sequencer.. Click on thumbnail to view full-sized image.

```

::: WAIT_FOR SECS 3 .
::: ALARM_LIST PBAR 23 .

```

Bypasses the D59 alarm list entitled "PULSED" (pulsed devices).



Pbar alarm list 23 after it has been bypassed by the Pbar Sequencer. Click on thumbnail to view full-sized image.

## Fast Recycler Start

```

::: SET_SEQ FILE 1 .
File #1 first turns off the pulsed devices.
D:LVN      TURN DEVICE OFF      ok
D:PMAGV    TURN DEVICE OFF      ok
D:ISEPV    TURN DEVICE OFF      ok
D:IKIK     TURN DEVICE OFF      ok
D:EKIK     TURN DEVICE OFF      ok
D:EKIKQ    TURN DEVICE OFF      ok
D:ESEPV    TURN DEVICE OFF      ok
A:ISEP1V   TURN DEVICE OFF      ok
A:ISEP2V   TURN DEVICE OFF      ok
A:IKIK     TURN DEVICE OFF      ok
File #1 then turns off ARF1.
A:R1L1AM   TURN DEVICE OFF      ok
A:R1L2AM   TURN DEVICE OFF      ok
A:R1HLSC   TURN DEVICE OFF      ok
File #1 then disables the A:EXTRAT Pbar extraction parameter and sets
Accumulator extraction kicker timing.
A:EXTRAT   EVENT DISABLE        ok
A:EKIKTG   SET DEVICE           13.8365    ok
File #1 then turns off some AP2 line devices.
D:Q701     TURN DEVICE OFF      ok
D:Q702     TURN DEVICE OFF      ok
D:H704     TURN DEVICE OFF      ok

::: SET_SEQ FILE 83 .
File #83 sets core horizontal and vertical cooling to gate off for
three seconds during reverse proton events injections.
A:CBPON    SET DEVICE           3
ok
A:CBPOFF   SET DEVICE           0
ok
A:CBPON    SET TIMER REFER      99
ok
A:CBPOFF   SET TIMER REFER      99
ok
A:CBPON    EVENT ENABLE
ok
A:CBPOFF   EVENT ENABLE        ok

::: SET_SEQ FILE 85 .
File #85 is labeled RunIIb Misc. settings. It sets up the ARF1
fanback voltage and phase read back sample and hold trigger timers both
to be 1.575 seconds after a an Accumulator to Main Injector transfer
event $9A.
A:R1HLT1   SET DEVICE           1.575      ok
A:R1HLT1   SET TIMER REFER      9A
ok
A:R1HLT1   EVENT ENABLE
ok
sets
A:R1HLT2   SET DEVICE           1.575
ok
A:R1HLT2   SET TIMER REFER      9A
ok
A:R1HLT2   EVENT ENABLE        ok
File #85 also sets up the ARF1 Accumulator to Main Injector frequency
track and hold timers to be zero seconds and 0.000211 seconds after a
an Accumulator to Main Injector transfer event
$9A.
A:R1LLT3   SET DEVICE           0

```

## Fast Recycler Start

```

ok
A:R1LLT3 SET TIMER REFER      9A
ok
A:R1LLT3 EVENT ENABLE
ok
A:R1LLT4 SET DEVICE           .000211
ok
A:R1LLT4 SET TIMER REFER      94
ok
A:R1LLT4 EVENT ENABLE                                     ok
File #85 also sets the A:IBMS1 sample time to be .1 seconds after an
Unstack TCLK event ($91) or a Pbar Production TCLK event ($80)
.
A:IBMS1 SET DEVICE            .1
ok
A:IBMS1 SET TIMER REFER       91  80
ok
A:IBMS1 EVENT ENABLE                                     ok

File #85 also sets the A:IBMS1 sample time to be 1 second after an
Injected Pbar synch event ($94) or a Pbar Production TCLK event ($80).

A:IBMS2 SET DEVICE            1
ok
A:IBMS2 SET TIMER REFER       94  80
ok
A:IBMS2 EVENT ENABLE                                     ok
File #85 also sets the AP3 SEM clear timer. The 14 6 errors says that
the requested data has not changed. This is probably due to the fact
that the $9A event is already present and the $E1 event is not
present. As a result the timer is already in the correct
configuration before the commands are run.
D:SMB2C ADD TIMER EVENT       9A                                     14 6
D:SMB2C REMOVE TIMER EVNT     E1                                     14 6
File #85 also sets the Debuncher Extraction kicker septa charge timer.
It changes it from $80 + 0.4 seconds to $90 + 0.00001 seconds.
D:ESEPC SET DEVICE            .00001
ok
D:ESEPC ADD TIMER EVENT       90
ok
D:ESEPC REMOVE TIMER EVNT     80                                     ok
File #85 also changes the DRF1 Master Trigger time to trigger zero
seconds after a TCLK event $02, which goes out every five seconds.
This keeps the DRF1 cavities in tune during the shot setup process.
When return to stacking the DRF1 master trigger will be returned to
triggering off of a MIBS $79 event.
D:R1LLMT EVENT DISABLE
ok
D:R1LLTT SET TIMER REFER      02
ok
D:R1LLTT SET DEVICE           0
ok
D:R1LLTT EVENT ENABLE                                     ok
::: CTL_DEVICE A:ISHUTO OFF .
    Turns off the accumulator injection shutter open timer. The
    Accumulator injection shutter will now not be told to open.
::: CTL_DEVICE A:ESHUTO OFF .
    Turns off the accumulator extraction shutter open timer. The
    Accumulator extraction shutter will now not be told to open.
::: CTL_DEVICE A:ISHUTC ON .

```

## Fast Recycler Start

Turns on the accumulator injection shutter close timer. The shutter open timer was disabled and the shutter closed timer was enabled. This ensures that the Accumulator Injection shutter stays closed. The Accumulator injection shutter position can be verified by looking at A:ISHTST. A reading of 1 means open and a reading of 2 means closed. The Accumulator injection shutter controller is located in the top of rack B17R01 at AP10 as shown below.



Click on thumbnail to view full-sized image

```
::: CTL_DEVICE A:ESHUTC ON .
```

Turns on the accumulator extraction shutter close timer. The shutter open timer was disabled and the shutter closed timer was enabled. This ensures that the Accumulator Extraction shutter stays closed. The Accumulator extraction shutter position can be verified by looking at A:ESHTST. A reading of 1 means open and a reading of 2 means closed. The Accumulator extraction shutter controller is located in the middle of rack B17R01 at AP10 as shown below.

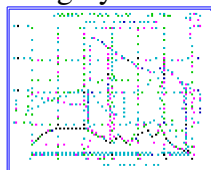


Click on thumbnail to view full-sized image.

```
::: START_PGM SA1144 .
```

```
::: START_PGM SA1144 .
```

Starts the Stack-o-meter SA (keeper is David Sutherland) on comfort display console 101. If this plot dies, it can easily be restarted as follows. From CNS1, do a CNTL-SHIFT-4 to get to the CNS101 comfort display. Go to P69 and then click PLOT!! under the lifetime category.



Pbar Life-o-Meter. Click on thumbnail to view full-sized image.

```
::: INSTRUCT 302 .
```

```
Start the VSA display on this console using slot C.  
Select concole [Lc1] and target slot 0xSC.
```

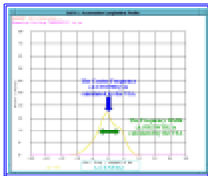
```
Interrupt anywhere in this box to continue.
```

```
::: START_PGM SA1156 .
```

Accumulator Momentum profile using the VSA (keeper is Dave McGinnis). This is normally run on the SC screen of the console that runs the Pbar Sequencer, and can be restarted from P142. SA1156 calculates the center frequency (A:CENFRQ) and frequency width (A:FRWDTH) of the Accumulator beam. If the momentum cooling is being run too hard, you will see a coherent spike on the display. If bad enough, the coherent spike can be larger than the plot scale.

## Fast Recycler Start

This is an indication of an instability, and it also affects the VSA calculations (for example, it makes the frequency width artificially small). If coherent spikes are seen on the trace, you can lower the 2-4GHz momentum power until the spike goes away. A:SPIKE is a datalogged parameter that measures how bad the coherent spike is on the VSA display. Values above 20% can indicate excessive coherent spikes on the display. Below is a typical SA1136 display that is not exhibiting coherent spike problems.



Accumulator Momentum Distribution. Click on thumbnail to view full-sized image.

The VSA display can also be viewed on CATV Pbar #16 as shown here.



The hp 89440A VSA is located in the AP10 control room in rack A14R04 as shown here.



Click on thumbnail to view full-sized image.

**What if the VSA plot does not start?** Occasionally the VSA will not start. When that is the case, follow the directions in the Pbar Elog at [http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=pbar04&action=view&page=19&anchor=174245&hilit=17:42:45-%20target=\\_top](http://www-bd.fnal.gov/cgi-mach/machlog.pl?nb=pbar04&action=view&page=19&anchor=174245&hilit=17:42:45-%20target=_top) to configure the VSA.

```
::: WAIT_FOR SECS 15 .
    Delay to allow SA1156 to start.

::: ACL SET_FROM_READING .

::: SET_DEVICE A:VSAFWD -=5 .
    Lowers the desired accumulator frequency width by 5Hz.

::: SETIT_DEVICE A:DTMHVE =.5 .
    Sets the horizontal minus vertical emittance difference for VSA
    vertical thermostat. If the VSA is in momentum and vertical thermostat
    mode (A:VSARST = 7), then this parameter would be used to determine
    when to turn off the vertical cooling. When running in this mode, if
    the difference between the horizontal and vertical emittances becomes
    greater than A:DTMHVE, then the vertical cooling is gated off.

::: SETIT_DEVICE A:VSARST =5 .

::: CHECK_DEVICE A:VSAFWS READING .

::: INSTRUCT 303 .
```

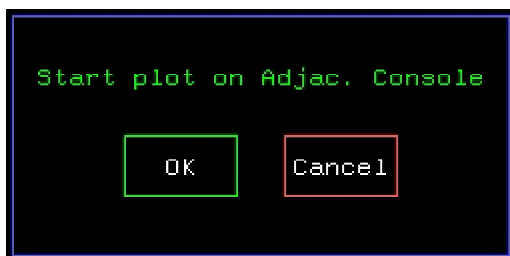
## Fast Recycler Start

**STOP!** The VSA and cooling have been set up as a function of stack size by setting A:VSAFWD 5 Hz less than A:VSAFWS (the suggested VSAFWD based on stack size). If studies are being conducted with a large stack, it is necessary to set the desired frequency, A:VSAFWD, to a more reasonable value of at least 25.

Regularly monitor the emittances, frequency width, and stack size to ensure stability using the plot started next.

Interrupt anywhere in this box to continue.

::: ACKNOWLEDGE .



::: AUTO\_PLOT Core Emittances .

::: SPECTRUM\_LOAD 2 7 .

::: SEQ\_PGM REQUEST AP0 Scope .

::: CHECK\_DEVICE A:R2DDS1 SAVE\_SET .

::: CHECK\_DEVICE A:R2LLAM SAVE\_SET .

::: CHECK\_DEVICE A:DPHATT SAVE\_SET .

::: CUSTOM COOL\_GAIN .

::: SET\_DEVICE A:DPHATT =5 .

::: SEQ\_PGM REQUEST Acc Gap Mon .

::: CHECK\_DEVICE A:SCRES SAVE\_SET .

::: SET\_DEVICE A:SCRES +=1.8 .

::: ALARM\_LIST PBAR 76 .

Bypasses the D59 alarm list entitled “DEB COOL” (Debuncher Cooling). This list contains a number of other lists.



Pbar alarm list 76 after it has been enabled by the Pbar Sequencer. Click on thumbnail to view full-sized image.

::: SET\_SEQ FILE 92 .

File #92 opens the Debuncher cooling PIN switches to turn off the Debuncher cooling during the shot setup.

D:H1PS1 TURN DEVICE OFF

ok

D:H2PS1 TURN DEVICE OFF

ok

D:H3PS1 TURN DEVICE OFF



## Fast Recycler Start

```
ok
D:H4PS1  TURN DEVICE OFF      ok
D:V1PS1  TURN DEVICE OFF
ok
D:V2PS1  TURN DEVICE OFF      ok
D:V3PS1  TURN DEVICE OFF
ok
D:V4PS1  TURN DEVICE OFF
ok
D:P1PS1  TURN DEVICE OFF
ok
D:P2PS1  TURN DEVICE OFF
ok
D:P3PS1  TURN DEVICE OFF
ok
D:P4PS1  TURN DEVICE OFF      ok
ok INSTRUCT 309 .
```

Move on to the next aggregate, **Fast Recycler Reverse Protons**.

Interrupt anywhere in this box to continue.

**Fast Recycler Aggregate:** **Fast Recycler Start** has been completed.

**Next Aggregate:** Fast Recycler Reverse Protons

**How to get back to stacking form here:**